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# Simultaneous bilateral decortications via video-assisted thoracic surgery for bilateral empyema



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## ABSTRACT

**INTRODUCTION:** Bilateral empyema is a rare and life-threatening condition that is difficult to treat. We herein report a case of bilateral empyema that was treated with simultaneous bilateral decortications via video-assisted thoracic surgery (VATS).

**PRESENTATION OF CASE:** A 38-year-old female complained of chest pain, dyspnea, and high grade fever lasting two weeks. Computed tomography revealed bilateral notching pleural effusion and pneumonia with atelectasis. Bilateral thoracic drainage was performed. From the right chest, white pus was drained, and *Streptococcus anginosus* was identified. The left drainage fluid was serous, and no bacteria were identified. We diagnosed the patient with right empyema and left para-pneumonic effusion consequent to pneumonia. Because conservative therapies could not resolve the inflammatory findings, simultaneous bilateral VATS decortications were performed. Both thoracic cavities had loculated pleural effusion. In contrast to the preoperative findings, white pus was found in not only the right, but also the left thoracic cavity. She had an uncomplicated postoperative course and recovered.

**DISCUSSION:** Bilateral empyema that has developed to the fibrinopleural phase is difficult to treat with drains alone. Bilateral VATS decortications helped to make a definitive diagnosis and treat both sides simultaneously.

**CONCLUSION:** Simultaneous bilateral VATS decortications should be considered as a feasible and effective procedure for bilateral empyema that is refractory to medical treatment.

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## 1. Introduction

Empyema thoracis is a severe condition accompanying pneumonia, which is associated with a high mortality rate ranging between 6% and 24% [1]. It is usually unilateral, and bilateral cases are rare [2]. Compared with unilateral empyema, bilateral empyema may be more severe, and its treatment would be expected to be more difficult. It has been reported that decortication via video-assisted thoracic surgery (VATS) has high success rates ranging from 68% to 93% [3]. However, most of the reported cases were unilateral cases. Thus, the effectiveness and safety of the procedure for bilateral cases have not been established. We herein report a case of bilateral empyema that was treated with simultaneous bilateral VATS decortication.

## 2. Presentation of case

A 38-year-old female complained of chest pain, dyspnea, and a high grade fever lasting two weeks. She went to another hospital,

and a chest X-ray was performed. It showed right lentoid and left decrescent pleural effusion (Fig. 1). Right empyema was suspected, and she was referred to our hospital for further evaluation and treatment. Although she had been diagnosed with diabetes mellitus, she had not undergone medical treatment for control. She could not walk due to her symptoms and came into the examination room by wheelchair. The patient was emaciated (165 cm, 40 kg), and had moist rales and tooth decay in several teeth. The SpO<sub>2</sub> on the room air was 91%. She was a current smoker. Her WBC was 20,900/ml and her CRP was 43.57 mg/dl. Her blood glucose was 289 mg/dl and her HbA1c was 18.5%.

Computed tomography revealed bilateral pleural effusion (Fig. 2A) and bilateral pneumonia with atelectasis (Fig. 2B). After the admission, bilateral thoracic drainage with 14 Fr catheters was performed. From the right chest, about 1000 ml of white pus was drained initially. Gram-positive cocci were detected in the pus, and *Streptococcus anginosus* was identified by culture. On the other hand, from the left cavity, about 800 ml of serous effusion was drained, and no bacteria were identified by gram staining or culture tests (Table 1). Approximately 200–400 ml/day of pus from the right side and serous effusion from the left side were drained continuously.

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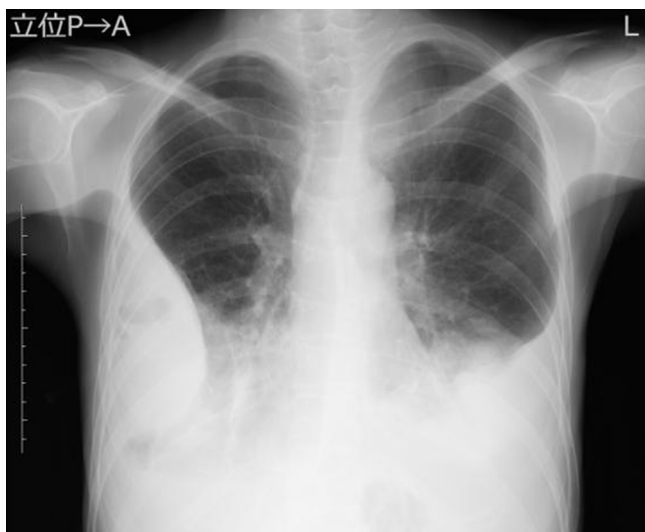


Fig. 1. A chest X-ray showed right lentoid and left decrescent pleural effusion.

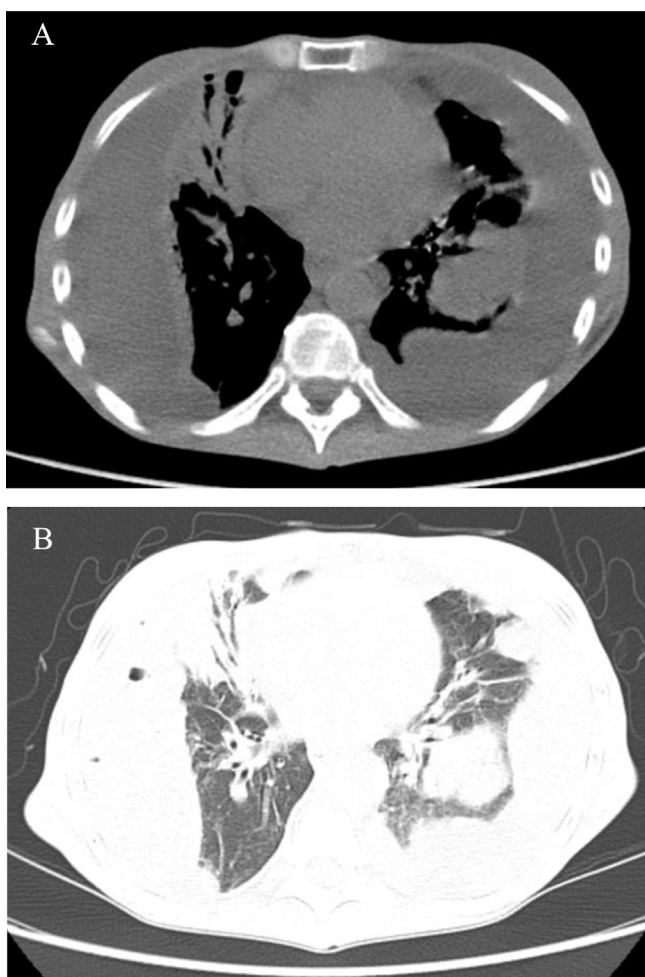


Fig. 2. Chest computed tomography revealed bilateral pleural effusion (A) and bilateral pneumonia with atelectasis (B).

Meropenem was prescribed just after the initiation of drainage, and the *S. anginosus* sensitivity was identified in the culture report at a later date. According to these findings, we diagnosed right empyema and left para-pneumonic effusion consequent to severe pneumonia. Respiratory physical therapy with an aggressive

stir-up regimen was performed by physical therapists. Her blood sugar was controlled with regular insulin. On day five after the admission, re-expansion of the lung and improvement of the pneumonia were identified on both sides. Although the patient's respiratory condition had improved, with an SpO<sub>2</sub> of 98% on room air, the high grade fever continued. We thus performed bilateral decortication via VATS.

We performed the operation under general anesthesia with differential lung ventilation by a Bron-Chocath®. In order not to expand the right infection to the left lung, we performed the left procedure initially. In the left decubitus position, the procedure was performed using three ports. The thoracic cavity was multi-loculated by the fibrous membrane and adhesions of the lung. The pleural effusion present in the space in which the drainage catheter had been placed did not seem to be infectious. However, white pus flowed out from the separated space beside pericardium during the abrasion and decortication. A 28 Fr drain was placed in the chest cavity. After the patient's position was changed to the opposite decubitus position, the right procedure was performed in the same way. Many purulent membranes and adhesions were identified throughout the thoracic cavity. In the culture test, *S. anginosus* was detected from the left pleura, but not from the right (Table 1). The patient had an uncomplicated postoperative course. The chest drains were removed on the sixth day after the operation, and she was discharged on foot on the 19th day after the operation.

### 3. Discussion

The American College of Chest Physicians Parapneumonic Effusions Panel published evidence-based guidelines for the treatment of parapneumonic effusion in 2000 [4]. According to this guideline, the estimated risk for a poor outcome is determined by the pleural space anatomy, pleural fluid bacteriology, and pleural fluid chemistry. The cases whose pleural fluid is pus are categorized into the highest risk group, and tube thoracostomy alone appeared to be insufficient treatment. Referring to these recommendations, we considered the need for surgical intervention at the time of the initial diagnosis.

Because poor oxygenation would prevent the use of general anesthesia with different lung ventilation, we paid special attention to treating the pneumonia preoperatively. Traditionally, large bore chest tubes have been recommended to facilitate the drainage of thick pus [1]. However, such large drains, especially bilateral drains, may induce severe pain, and make the patient bedridden, causing the exacerbation of pneumonia. Thus, we did not use a large drain, and just placed a small catheter for preoperative drainage. As a result, the pneumonia improved without pain, limitation of activity or the development of systemic sepsis due to the empyema. It has been reported that small drainage catheters are as effective as large catheters in the management of infected pleural fluid collections [5,6]. When a surgical operation is planned, the use of a small catheter may be better than a large chest tube when selecting the initial drain.

In the current case, the initial diagnosis based on the fluid collected from the preoperative drains was right empyema and left simple para-pneumonic effusion. However, the left pleural cavity also included infected pus, which was in a separate space that the drain did not locate. The present results are consistent with a previous study showing that the bacteria cannot be identified in 26.4% of pleural effusions from empyema patients [7]. Empyema in association with pneumonia develops via three stages [1]. The first is the exudative phase, in which simple pleural fluid from lung inflammation exudates and accumulates in the pleural space. The second is the fibrinopurulent phase, in which exudative fibrin deposits and separates the pleural cavity. The third is the

**Table 1**  
The clinical findings.

Site	Right	Left
Pleural effusion		
Appearance		
Preoperatively	White pus	Serous
During the operation	White pus	Mostly serous but white pus was seen in the mediastinal region
Bacterial culture		
Preoperatively	<i>Streptococcus anginosus</i> (+)	Negative
During the operation	Negative	<i>Streptococcus anginosus</i> (+)
Gram staining		
Preoperatively	Positive	Negative
During the operation	Negative	Positive
Order of operation	Second	First
Length of operation	1 h 40 min	2 h 00 min

organizing phase, in which the septal walls progress to form a solid pleural peel. Late empyema requires treatment with standard thoracotomy and decortication to free the encased lung from the peel, and is associated with high morbidity and mortality rates [8].

Thus, intermediate-phase empyema that is refractory to medical treatment should be considered for surgical management as early as possible [8]. A sequential second-look operation could lead to a missed opportunity for treatment due to postoperative complications or an inadequate diagnosis. In contrast, bilateral VATS decortications can allow for both a definitive diagnosis to be made and for the empyema on both sides to be treated simultaneously. In cases of empyema with multiloculate spaces, the diagnosis by thoracentesis or drainage may be inaccurate. We believe that when VATS decortication is planned for unilateral empyema, if suspected pleural effusion exists on the opposite side, a simultaneous VATS evaluation for the opposite side should also be performed for the definitive diagnosis.

The order of the operation when performing simultaneous bilateral VATS decortication should be decided by the lung condition and severity of the empyema. The side on which the expansion of the lung is poorer should be treated initially to provide better perioperative oxygenation under the different lung ventilation. When the side in which the effusion is more infectious has to be treated initially, the equipment for the opposite operation should be changed to prevent the expansion of the infection to the opposite side.

#### 4. Conclusion

Simultaneous bilateral VATS decortications should be considered as a feasible and effective procedure for treating bilateral empyema that is refractory to medical treatment.

#### Conflict of interest

We have no conflicts of interest.

#### Funding

We do not have any sponsors.

#### Ethical approval

This is not clinical research but case report. We think ethical approval is not need.

#### Author contribution

Naohiro Nose MD, Ph D; data collection, data analysis, writing. Toshiki Anami MD; data collection, data analysis, writing.

#### Consent

No image or sentence by which the patients can be identified is included in our article. We have obtained written consent from the patient. When the Editor asks to see it, we can provide it.

#### Guarantor

Guarantor of this case report is Naohiro Nose.

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